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ABSTRACT

This study was designed to determine if the addition of music and sound effects to recorded stories increased the comprehension and retention of information presented on tape to fourth grade students at three levels of reading ability. Two versions of four narrated stories were recorded, one version with music and sound effects, the other with only the narration. A listening comprehension test administered after students had listened to each of the stories was followed by a retention test two weeks later. Students listening to the music and sound effects versions scored higher on both the listening and retention tests. Implications of these findings are discussed, and a bibliography is included. (Author/CMV)

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THE EFFECT OF MUSIC AND SOUND EFFECTS ON THE LISTENING COMPREHENSION OF FOURTH GRADE STUDENTS

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The purpose of this study was to determine if the addition of music and sound effects to recorded stories increased the comprehension and retention of information presented on tape for fourth grade students. Two versions of four narrated stories were recorded--one version with music and sound effects, the other included the narration only. A listening comprehension test was administered after listening to each of the stories and followed by a retention test two weeks later. Students listening to the music and sound effects versions scored significantly higher on both the listening comprehension and retention tests.

INTRODUCTION

Listening is one of the first activities in the life of every individual. Research has indicated that newborn infants can make "fine discriminations in sounds. Sounds have meaning for babies, even before they have learned language" (16).

Children learn to speak primarily through listening to others. However, primary children have difficulty in listening effectively to dialogues encountered in story-telling situations or in following instructions (3, 4, 14, 17,). Many of the reasons why children have difficulty in listening have not been identified.

The importance of listening as a distinct learning process has been stressed by psychologists and educators for some time. Duker states that listening "has always been and continues to be the most widely used human means of receiving information" (7) from others. An individual's listening activities are basic in order to learn to "speak, read, and write" (6).

Studies by Rankin and Wilt indicate children spend over fifty per cent of their school day listening (9, 19)

and students who score high on listening comprehension tests normally do better in school (15). Studies have also shown that students can be taught to listen more effectively (11).

Even though listening has received much recognition and the importance of listening has been stressed by many educators, very little research has been done on what factors contribute to one's ability and willingness to listen. Although numerous articles about listening have been written, few are based on systematic research on listening as an information gathering psychological process.

Also important is the lack of research on the numerous instructional presentation modes, all of which have an effect on the listening process.

> In view of the increasing instructional use of a wide range of teaching materials and presentation media--such as video cassettes, audiovisual teaching kits, audio cassettes, etc.--the necessity for such systematic investigation is readily apparent particularly in that some media may be more or less effective than others (20, p. 32).

The increase of media utilization in American schools during the past twenty-five years has been unprecedented and the potential educational significance of these materials is tremendous. However, the instructional potential of media can never be achieved without a solid foundation of research and understanding of children's listening competence (20).

Statement of the Problem

The problem of this study was to determine the effect, if any, of music and other sound effects on listening comprehension and recall of fourth grade students.

Purposes of the Study

The purposes of this study were:

1. To determine if fourth grade students' comprehension of stories recorded with music and sound effects was greater than straight narrative stories.

2. To determine if fourth grade students' recall of information from stories recorded with music and sound effects was greater than straight narrative stories.

3. To determine if fourth grade students' reading ability was a factor in comprehension and recall of information from stories recorded with music and sound effects or those stories recorded without music and sound effects.

Hypotheses

The following hypotheses were tested by statistical analysis of the data collected:

1. There will be no significant difference in the comprehension of information by fourth grade students who listened to narrated stories with music and other sound effects and by those who listened to the same stories without music and other sound effects.

2. There will be no significant difference in the comprehension of information by fourth grade students with low reading abilities who listened to narrated stories with music and other sound effects and by those who listened to the stories without music and other sound effects.

3. There will be no significant difference in the comprehension of information by fourth grade students with average of medium reading abilities who listened to narrated stories with music and other sound effects and by those who listened to the stories without music and other sound effects.

4. There will be no significant difference in the comprehension of information by fourth grade students with high reading abilities who listened to narrated stories with music and other sound effects and by those who listened to the stories without music and other sound effects.

5. There will be no significant difference in the retention of information by fourth grade students who listened to narrated stories with music and other sound effects and by those who listened to the stories without music and other sound effects.

6. There will be no significant difference in the retention of information by fourth grade students with low reading abilities who listened to narrated stories with

music and other sound effects and by those who listened to the stories without music and other sound effects.

7. There will be no significant difference in the retention of information by fourth grade students with average reading abilities who listened to narrated stories with music and other sound effects and by those who listened to the stories without music and other sound effects.

8. There will be no significant difference in the retention of information by fourth grade students with high reading abilities who listened to narrated stories with music and other sound effects and by those who listened to the stories without music and other sound effects.

METHODOLOGY

Population

The subjects involved in this study were 107 fourth grade students enrolled in two elementary schools in a public school district in north-central Texas. The students represented all fourth grade students enrolled in both elementary schools. The school district encompasses a small city and the surrounding rural area. The two schools used in the study were selected because they each had self-contained classrooms where all activities could be conducted.

Procedures for Conducting the Study

To eliminate the possibility that differences in the composition of treatment groups might bias the study, an

experimental design was developed for use with this study which allowed the entire sample to function as the experimental and the control group. The five classes of fourth grade students available for the study were arbitrarily assigned to Group A or Group B with an attempt to have approximately equal numbers in each group. Each of the five classes listened to four taped stories ranging from five to ten minutes in length. Each group received two of the stories presented in the control format ant two stories in the experimental format. The net result assured the the experimental and control groups were, in fact, equal. Group A and Group B were never compared against one another; only the treatment scores were compared. The two audio presentation formats utilized in the study were:

1. Four stories were narrated and recorded on monaral cassette for playback.

2. The four stories were revised by including music and sound effects in a radio drama format though the narration remained unchanged.

The study was conducted during the month of May, 1978, at the same time each day. The students were informed at the beginning of the first day that they would be listening to four stories, one each day for four days, and would be asked to answer a twenty item multiple-choice test over each of the stories.

Two weeks after listening to the fourth story, all students were administered a recall test to measure retention of information from the stories. The recall test was composed of ten multiple-choice questions selected from each of the four comprehension tests. Thus the recall test was a forty item test. No discussion of the stories was conducted between the time of the first tests and the final recall test. Only the scores of those students who were present on all four days and took the recall test were included in the final analyses.

The week preceding the administration of the listening comprehension tests, all subjects in the study had been administered the California Test of Basic Skills (CTBS) along with all students in the school system. The Reading Vocabulary and Reading Comprehension scores were combined in the analyzed data to give a total "Reading" score expressed as a "National Percentile" score. The "National Percentile" score was utilized to divide the total subject population into three groups of approximately equal size representing the upper, middle, and lower thirds of the test population.

Collection of the Data

Each subject had test scores from each of the four comprehension tests and the four part recall test. The tape treatments that each student received were recorded and

utilized to separate scores into "music and sound effects" and "narration only" columns. The net result was a total of two scores for each subject for each of the two treatments. There were thirty-six subjects in the high reading category, thirty-seven subjects in the medium category, and thirty-four subjects in the low category.

Treatment of the Data

The data for this study were obtained from the four twenty item multiple-choice tests for comprehension, the forty item multiple-choice test for recall, and the CTBS National Reading Percentile. The data from the comprehension tests and the recall test were analyzed separately utilizing the same procedures. The data from the comprehension test scores were analyzed by a two factor analysis of variance with repeated measures. When an overall significant difference was found between groups, a multiple comparison test was run to determine which pairs of treatment levels were significantly different. Within each reading level group, an analysis of va ance test was conducted to determine if a significant difference in treatments was found. The same procedures were used in the analysis of the data from the recall test. The level of significance for this study was the .05 level.

The statistical data was analyzed by the Computer Center at North Texas State University and is presented

in table form. From the findings, conclusions were drawn, educational implications stated, and recommendations made.

PRESENTATION OF THE FINDINGS

The cell data for the comprehension test scores are recorded in Table I. The population is divided into high, medium, and low reading ability, and includes scores for the total population. In addition to the number of subjects (N) in each cell, the mean (M) and standard deviation (SD) for each treatment combination, and the combined total treatment scores are included.

TABLE I

NUMBER OF SUBJECTS, MEANS, AND STANDARD DEVIATIONS FOR THE COMBINED SCORES OF COMPREHENSION TESTS AND THE COMBINED MEANS OF THE MAIN VARIABLES

Reading Group		Music and Sound Effects	Narration Only	Group Means
High	N M SD	36 35.1389 2.9096	36 34.6667 3.3722	34.9028
Medium	N M SD	37 31.6486 4.4921	37 29.8649 5.2766	30.7568
Low	N M SD	34 24.1471 7.6441	34 21.7647 8.0756	22.9559
Total	N M SD	107 30.4393 6.9678	107 28.9065 7.8398	

A comparison of the mean scores for both treatments within each group and for the total population yield a higher mean score for the music and sound effects treatment than the narration only treatment. It should also be noted that the mean scores for both treatments were higher for the high reading group and lowest for the low reading group.

TABLE II

NUMBER OF SUBJECTS, MEANS, AND STANDARD DEVIATIONS FOR THE COMBINED SCORES OF THE RECALL TEST AND THE COMBINED MEANS OF THE MAIN VARIABLES

Reading Level		Music and Sound Effects	Narration Only	Group Means
High	N M SD	36 18.0278 1.6985	36 17.0556 2.8380	17.5417
Medium	N M SD	37 15.6486 3.0507	37 14.3514 3.2678	15.0000
Low	N M SD	34 10.9706 4.7064	34 10.0000 4.4107	10.4853
Total	N M SD	107 14.9626 4.4147	107 13.8785 4.5468	

The cell data for the recall tests are given in Table II. Again, the population is divided into high, medium, and low reading ability groups, and include scores for the total population. In addition to the number of subjects (N) in each cell, the mean (M) and standard deviation (SD) for each treatment combination, and the combined total treatment scores are included.

As with the comprehension test scores, a comparison of the mean scores for both treatments within each group and for the total population yield a higher mean score for the music and sound effects treatment than the narration only treatment. Again, the total means for the high reading group was highest and the low reading group lowest.

In order to determine if the observed differences between the treatments and between the groups were significantly different, the experimental data presented in Table I and Table II were analyzed by two factor analysis of variance with repeated measures. The results are shown in Table III and Table IV.

The results of the two factor analysis of variance with repeated measures for listening comprehension is presented in Table III. The analysis of effects between the reading groups with two degrees of freedom yielded a sum square of 5242.9455, a mean square of 2621.47275, and F Ratio of 49.35601, and a P value of 0.0000 which means the difference

is significant at the .01 level. The analysis of the treatments with 1 degree of freedom yielded a sum of squares and mean squares total of 127.73243, an F Ratio of 13.56032, and a P value of 0.00037 which is significant at the .01 level also. The analysis for treatment interaction with 2 degrees of freedom yielded a sum of squares score of 34.00209, a mean square of 17.00104, and an F Ratio of 1.80486, and a P value of 0.16950 which is not significant at the .05 level.

TABLE III

TWO FACTOR ANALYSIS OF VARIANCE WITH REPEATED MEASURES OF THE EFFECTS THAT MUSIC AND SOUND EFFECTS AND NO MUSIC AND SOUND EFFECTS HAVE ON LISTENING COMPREHENSION

Source	DF	Sum of Squares	Mean Squares	F Ratio	P
Between Reading Groups	2	5242 94550	2621 47275	49.35601*	0.00000
Treatment Effects	1	127.73243	127.73243	13.56032*	0.00037
Treatment Interaction	2	34.00209	17.00104	1.80486	0.16950
Within Cell Error	104	979.63595	9.41958		
Total	109	6384.31597			

* Statistically significant at P 0.05

TABLE IV

TWO FACTOR ANALYSIS OF VARIANCE WITH REPEATED MEASURES OF THE EFFECTS THAT MUSIC AND SOUND EFFECTS AND NO MUSIC AND SOUND EFFECTS HAVE ON RECALL

Source	DF	Sum of Squares	Mean Squares	F Ratio	
Between Reading Groups	2	1819.95141	909.97570	46.80713*	0.00000
Treatment Effects	1	62.32917	62.32917	14.25180*	0.00027
Treatment Interaction	2	1.26113	0.63056	0.14418	0.86590
Within Cell Error	104	454.83627	4.37343		
Total	109	2338.37798			

* Statistically significant at P 0.01

The results of the two factor analysis of variance with repeated measures test for recall is given in Table IV. The analysis of affects between the reading groups with two degrees of freedom yielded a sum of squares of 1819.95141, a mean squares of 909.97570, an F Ratio of 46.80713 and a P value of 0.0000 which is significant at the .01 level. The analysis of the treatments with one degree of freedom yielded a sum of squares score of 62.32917, a mean square score of

62.32917, ar F Ratio of 14.25180, and a P value of 0.00027 which is significant at the .01 level. The test for interaction with two degrees of freedom yielded a sum of squares score of 1.26113, a mear squares score of 0.63056, and F Ratio of 0.14418, and a P value of 0.86590 which means interaction is not significant at the .05 level.

To determine how each reading level reacted to the separate treatments a single factor analysis of variance with

TABLE V

ANALYSIS OF VARIANCE OF THE EFFECTS OF MUSIC AND SOUND EFFECTS AND NO MUSIC AND SOUND EFFECTS HAVE ON THE LISTENING COMPREHENSION OF HIGH, MEDIUM, AND LOW READING GROUPS

Source	DF	Sum of Squares	Mean Squares	F Ratio	P
High Reading Group	1	4.01389	4.01389	1.08495	0.30470
Medium Reading Group	1	58.86486	58.86486	5.11701*	0.02983
Low Reading Group	1	96.48529	96.48529	7.30254*	0.01079

* Statistically significant at P 0.05

repeated measures was carried out for each reading level for the listening comprehension tests and the recall test. The results are given in Table V and Table VI.

The data presented in Table V is for the independent analysis for the three reading levels of listening comprehension. The high reading group sum of squares and mean square is 4.01389, the F Ratio is 1.08495, and the P value is 0.30470 which is not significant at the .05 level. The medium reading group has a sum of squares and mean square score of 58.86486, an F Ratio of 5.11701, and a P value of 0.02938 which is significant at the .05 level. The low reading group has a sum of squares and mean square score of 96.48529, an F Ratio of 7.30254, and a P value of 0.01079 which is significant at the .05 level.

The data presented in Table VI is for the independent analysis for the three reading levels on the recall test. The high reading group sum of squares and mean square total is 17.01389, an F Ratio of 2.54012, and a P value of 0.02433 which is significant at the .05 level. The medium level received a sum of squares and mean square score of 31.13514, an F Ratio of 3.23262, and a P value of 0.08134 which is not significant at the .05 level.

The Scheffe F values for comparisons among reading groups for listening comprehension and recall tests are given in Table VII. The comparison of group means for the

TABLE VI

ANALYSIS OF VARIANCE OF THE EFFECTS OF MUSIC AND SOUND EFFECTS AND NO MUSIC AND SOUND EFFECTS HAVE ON THE RECALL OF HIGH, MEDIUM, AND LOW READING GROUPS

Source	DF	Sum of Squares	Mean Squares	F Ratio	P
High Reading Group	1	17.01389	17.01389	5.54012*	0.02433
Medium Reading Group	1	31.13514	31.13514	6.09613*	0.01843
Low Reading Group	1	16.01471	16.01471	3.23262	0.08134

* Statistically significant at P 0.05

high and medium reading groups gives a Scheffe's F test value of 5.9053 for the listening comprehension test and a 6.0632 value for the recall test; both were significant at the .05 level. The comparison of medium and low reading groups gives an F value of 20.3004 for listening comprehension and 18.5765 for recall; both of which are significant at the .05 level. The comparison of the high and low reading groups gives an F value of 46.9881 for listening comprehension and 44.7846 for recall; both again are significant at the .05 level.

TABLE VII

SCHEFFE'S F VALUES FOR COMPARISONS AMONG READING GROUPS FOR LISTENING COMPREHENSION AND RECALL TESTS

Group Comparison	F Value	
	Listening Comprehension	Recall
High-Medium	5.9053 *	6.0632 *
Medium-Low	20.3004 *	18.5765 *
High-Low	46.9881 *	44.7846 *

* Statistically significant at P 0.05

SUMMARY OF FINDINGS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Findings

1. It was hypothesized that there would be no significant difference in the listening comprehension scores of fourth grade students who listened to narrated stories with music and sound effects and those who listened to the same stories without music and sound effects. The analysis of the data reveals that the scores on the listening comprehension tests were significantly higher for those students who listened to the stories with music and sound effects.

2. It was hypothesized that there would be no significant difference in the listening comprehension scores of fourth grade students with low reading abilities who listened to stories recorded with music and sound effects and stories without music and sound effects. The analysis of the data reveals that the scores on the listening comprehension tests were significantly higher for those students who listened to the stories with music and sound effects.

3. It was hypothesized that there would be no significant difference in the listening comprehension scores of fourth grade students with medium reading abilities who listened to stories recorded with music and sound effects and stories without music and sound effects. The analysis of the data reveal that the scores on the listening comprehension tests were significantly higher for those students who listened to the stories with music and sound effects.

4. It was hypothesized that there would be no significant difference in the listening comprehension scores of fourth grade students with high reading abilities who listened to stories recorded with music and sound effects and stories without music and sound effects. The analysis of the data reveals that the scores on the listening comprehension tests were higher for those students who listened to the stories with music and sound effects, but the difference was not significant at the .05 level.

5. It was hypothesized that there would be no significant difference in the retention scores of fourth grade students who listened to narrated stories with music and sound effects and those who listened to the stories without music and sound effects. The analysis of the data reveals that the scores on the recall test were significantly higher for those students who listened to the stories with music and sound effects.

6. It was hypothesized that there would be no significant difference in the retention scores of fourth grade students with low reading abilities who listened to narrated stories with music and sound effects and those who listened to the stories without music and sound effects. The analysis of the data reveals that the scores on the recall test were higher for those students who listened to the stories with music and sound effects, but the difference was not significant at the .05 level.

7. It was hypothesized that there would be no significant difference in the retention scores of fourth grade students with medium reading abilities who listened to narrated stories with music and sound effects and those who listened to the stories without music and sound effects. The analysis of the data reveals that the scores on the recall test were significantly higher for those students who listened to the stories with music and sound effects.

8. It was hypothesized that there would be no significant difference in the retention scores of fourth grade students with high reading level abilities who listened to narrated stories with music and sound effects and those who listened to the stories without music and sound effects. The analysis of the data reveal that the scores on the recall test were significantly higher for those students who listened to the stories with music and sound effects.

Conclusions

Based on the data presented in this study and the limitations stated, the following conclusions have been drawn:

1. The addition of music and sound effects to recorded presentations increases the listening comprehension of fourth grade students.

2. Information from a recorded presentation with music and sound effects can be remembered longer by fourth grade students than the same information presented without music and sound effects.

3. Fourth grade students with high, medium, or low reading abilities comprehend and recall recorded information presented with music and sound effects to a greater degree than when the information is presented without music and sound effects.

4. Although the scores for the high reading group were not significantly higher for listening comprehension, for those listening to the music and sound effects stories, their mean scores were higher. After two weeks, those who listened to the music and sound effects did score significantly higher. The research indicates students who are better readers are also better listeners, so a significant difference might not appear immediately after a listening exercise but emerge after a period of time, thus explaining the significantly higher recall scores for the music and sound effects group.

5. The low reading group reacted completely opposite the high reading group by showing a significant difference in favor of music and sound effects immediately after listening to the stories but failed to score significantly higher on the recall test. The low readers, as the research also indicates, are poor listeners and even though the music and sound effects may have made an immediate difference in comprehension, this difference was not great enough to make a significant difference after a two week delay in recall of information.

Implications

The findings of this study indicate the inclusion of music and sound effects in taped programs for fourth grade students increases their ability to recall information

presented. Both long and short term memory of the material is increased. Although the data is not conclusive for all levels, there is a strong indication that the addition of music and sound effects to recorded material helps students at all levels of their language arts development.

Why the addition of music and sound effects should cause such an increase in comprehension and retention is not totally understood, but this and other research indicate several possibilities. The music and sound effects could aid in drawing attention to specific information being presented. The music and sound effects may mask out other possible distractions that may be occuring in the listening environment and allow the student to pay closer attention. The music and sound effects may help creat a mental image of what is being presented. It may be that music and sound effects play an important part in helping to visualize the message by adding "color" to the recorded message.

When students in this study were asked which programs they would like to listen to a second time, they overwhelmingly requested the stories they had heard with music and sound effects. What some educators and radio specialists have been saying for decades seems to be supported by research: music and sound effects added to audio programs do make a difference.

It seems fair to assume that today's children have grown accustomed to audio material being presented in a

professional, well produced format and tend to listen more effectively to programs produced in a more sophisticated manner. Because children are bombarded by sights and sounds from numerous sources, they may have become very selective in directing their attention. Sound sources that do not challenge or excite them tend to be disregarded, while sound sources that are exciting to their ears are listened to more concertedly.

The implications of this study should serve as somewhat of a warning for teachers and other educators--that care should be taken in selecting and preparing audio materials for use with children. When children have tape recorders at home with which to play, there is little interest in the technology itself to maintain interest in listening to a boring tape, especially when it is competing with eight tracks and stereo cassettes with all types of stimulating sounds. Besides being interested in the content of a recorded program, the quality of the production itself must be investigated by those selecting materials for children. If the teacher is not selective, the students will be.

The educator does not have to face the full brunt of the selection task alone. Producers of educational materials must share responsibility for the materials they produce. As funds for educational materials become more difficult to secure, the quality of those materials pur-

chased must provide the best quality for the money. As accountability for what educators teach and children learn continues to be stressed, the producers of educational materials must be held more accountable also.

Recommendations

While the findings of this study support the claim that music and sound effects increase the ability of fourth grade students to listen and comprehend information presented on recordings more effectively, several questions remain to be answered. This study dealt mainly with the recall of specific facts from the stories; higher level mental skills such as inference and critical thinking were not tested. Future research should include:

1. studies to investigate the effect of music and sound effects on the inference and critical thinking abilities of students;

2. studies to investigate the possibility that changes in the type of music and sound effects can change perception of what is happening in the story or recorded message;

3. studies to investigate the effect on attitude and possible attitudinal changes resulting in the selection of the music and sound effects;

4. studies to investigate the possible masking effect of over-use of music and sound effects.

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